IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method for ~~evaluating a condition of~~ locating load-bearing subdivisions and non-load-bearing subdivisions in a region of interest in a patient, the method comprising:

(a) ~~taking~~ inputting image data of the region of interest into a processor;

(b) extracting a structure from the image data in the processor; and

(c) automatically subdividing the structure into the load-bearing subdivisions and the non-load bearing subdivisions in the processor by:

(i) constructing a model of the structure;

(ii) determining a region in the model in which the load-bearing subdivisions should be located;

(iii) identifying candidate voxels for the load-bearing subdivisions in the image data;

(iv) defining the load-bearing subdivisions as sets of the candidate voxels located in the region determined in step (c)(ii); and

(v) defining the non-load-bearing subdivisions as subdivisions other than the load-bearing subdivisions~~; and~~

~~(d) calculating a biomarker for each of the load-bearing and non-load-bearing subdivisions~~.

2. (Original) The method of claim 1, wherein the region of interest includes a joint.

3. (Original) The method of claim 2, wherein the joint is a knee.

4. (Original) The method of claim 2, wherein the structure is cartilage in the joint.

5. (Original) The method of claim 2, wherein step (a) comprises taking MRI image data.

6. (Original) The method of claim 2, wherein step (b) comprises unsupervised segmentation of the image data to provide segmented image data.

7. (Original) The method of claim 6, wherein step (b) further comprises manual labeling of bone features in the segmented image data.

8. (Original) The method of claim 7, wherein step (b) further comprises determining whether the segmented image data are accurate and, if the segmented image data are not accurate, correcting the segmented image data in accordance with the manual labeling.

9. (Original) The method of claim 8, wherein step (b) further comprises relaxing boundaries of the bone features.

10. (Currently Amended) The method of claim [[1]] 23, wherein, in step (d), the biomarker comprises a biomarker selected from the group consisting of:

- cartilage roughness;
- cartilage volume;
- cartilage thickness;
- cartilage surface area;
- shape of the subchondral bone plate;
- layers of the cartilage and their relative size;
- signal intensity distribution within the cartilage layers;
- contact area between the articulating cartilage surfaces;
- surface topology of the cartilage shape;
- intensity of bone marrow edema;
- separation distances between bones;
- meniscus shape;

- meniscus surface area;
- meniscus contact area with cartilage;
- cartilage structural characteristics;
- cartilage surface characteristics;
- meniscus structural characteristics;
- meniscus surface characteristics;
- pannus structural characteristics;
- joint fluid characteristics;
- osteophyte characteristics;
- bone characteristics;
- lytic lesion characteristics;
- prosthesis contact characteristics;
- prosthesis wear;
- joint spacing characteristics;
- tibia medial cartilage volume;
- tibia lateral cartilage volume;
- femur cartilage volume;
- patella cartilage volume;
- tibia medial cartilage curvature;
- tibia lateral cartilage curvature;
- femur cartilage curvature;
- patella cartilage curvature;

- cartilage bending energy;
- subchondral bone plate curvature;
- subchondral bone plate bending energy;
- meniscus volume;
- osteophyte volume;
- cartilage T2 lesion volumes;
- bone marrow edema volume and number;
- synovial fluid volume;
- synovial thickening;
- subchondrial bone cyst volume;
- kinematic tibial translation;
- kinematic tibial rotation;
- kinematic tibial valcus;
- distance between vertebral bodies;
- degree of subsidence of cage;
- degree of lordosis by angle measurement;
- degree of off-set between vertebral bodies;
- femoral bone characteristics; and
- patella characteristics.

11. (Currently Amended) The method of claim 10, wherein the biomarker further comprises a higher-order ~~mreasure~~ measure.

12. (Original) The method of claim 11, wherein the higher-order measure is selected from the group consisting of curvature, topology and shape.

13. (Currently Amended) The method of claim [[1]] 23, wherein steps (a)-(d) are performed at a plurality of times, and wherein the method further comprises (e) determining a change [[in]] over time in each of the biomarkers calculated in step (d).

14. (Currently Amended) A system for ~~evaluating a condition of~~ locating load-bearing subdivisions and non-load-bearing subdivisions in a region of interest in a patient, the system comprising:

an input device for receiving an input of image data of the region of interest; and

a processor, in communication with the input device, ~~for~~ the processor being programmed to perform the following functions:

(a) receiving the image data of the region of interest from the input device;

(b) extracting a structure from the image data; and

(c) automatically subdividing the structure into the load-bearing subdivisions and the non-load bearing subdivisions by:

(i) constructing a model of the structure;

(ii) determining a region in the model in which the load-bearing subdivisions should be located;

(iii) identifying candidate voxels for the load-bearing subdivisions in the image data;

(iv) defining the load-bearing subdivisions as sets of the candidate voxels located in the region determined in step (c)(ii); and

(v) defining the non-load-bearing subdivisions as subdivisions other than the load-bearing subdivisions~~; and~~

~~(d) calculating a biomarker for each of the load-bearing and non-load bearing subdivisions~~.

15. (Original) The system of claim 14, wherein the processor performs step (b) through unsupervised segmentation of the image data to provide segmented image data.

16. (Currently Amended) The system of claim 15, wherein the input comprises an input for receiving a manual labeling of ~~b one~~ bone features in the segmented image data, and wherein the processor performs step (b) in accordance with the manual labeling.

17. (Original) The system of claim 16, wherein the processor performs step (b) further by whether the segmented image data are accurate and, if the segmented image data are not accurate, correcting the segmented image data in accordance with the manual labeling.

18. (Original) The system of claim 17, wherein the processor performs step (b) further by relaxing boundaries of the bone features.

19. (Currently Amended) The system of claim [[14]] 27, wherein the processor is programmed such that the biomarker comprises a biomarker selected from the group consisting of:

- cartilage roughness;
- cartilage volume;
- cartilage thickness;
- cartilage surface area;
- shape of the subchondral bone plate;
- layers of the cartilage and their relative size;
- signal intensity distribution within the cartilage layers;
- contact area between the articulating cartilage surfaces;
- surface topology of the cartilage shape;
- intensity of bone marrow edema;

- separation distances between bones;
- meniscus shape;
- meniscus surface area;
- meniscus contact area with cartilage;
- cartilage structural characteristics;
- cartilage surface characteristics;
- meniscus structural characteristics;
- meniscus surface characteristics;
- pannus structural characteristics;
- joint fluid characteristics;
- osteophyte characteristics;
- bone characteristics;
- lytic lesion characteristics;
- prosthesis contact characteristics;
- prosthesis wear;
- joint spacing characteristics;
- tibia medial cartilage volume;
- tibia lateral cartilage volume;
- femur cartilage volume;
- patella cartilage volume;
- tibia medial cartilage curvature;
- tibia lateral cartilage curvature;

- femur cartilage curvature;
- patella cartilage curvature;
- cartilage bending energy;
- subchondral bone plate curvature;
- subchondral bone plate bending energy;
- meniscus volume;
- osteophyte volume;
- cartilage T2 lesion volumes;
- bone marrow edema volume and number;
- synovial fluid volume;
- synovial thickening;
- subchondrial bone cyst volume;
- kinematic tibial translation;
- kinematic tibial rotation;
- kinematic tibial valcus;
- distance between vertebral bodies;
- degree of subsidence of cage;
- degree of lordosis by angle measurement;
- degree of off-set between vertebral bodies;
- femoral bone characteristics; and
- patella characteristics.

20. (Currently Amended) The system of claim 19, wherein the processor is programmed such that the biomarker further comprises a higher-order ~~mreasure~~ measure.

21. (Currently Amended) The system of claim 20, wherein the processor is programmed such that the higher-order measure is selected from the group consisting of curvature, topology and shape.

22. (Currently Amended) The system of claim [[14]] 27, wherein the processor performs steps (a)-(d) at a plurality of times and further performs (e) determining a change [[in]] over time in each of the biomarkers calculated in step (d).

23. (New) The method of claim 1, further comprising (d) calculating a biomarker for each of the load-bearing and non-load-bearing subdivisions.

24. (New) The method of claim 4, wherein the joint comprises condyles, and wherein step (c)(i) comprises determining a joint space in accordance with widths and extreme points of the condyles.

25. (New) The method of claim 24, wherein the region determined in step (c)(ii) is located in the joint space.

26. (New) The method of claim 25, wherein the candidate voxels are identified by dilating surfaces of two bones adjacent to the joint space and identifying the candidate voxels as voxels belonging to dilated versions of both of the two bones adjacent to the joint space.

27. (New) The system of claim 14, wherein the processor is further programmed to perform (d) calculating a biomarker for each of the load-bearing and non-load-bearing subdivisions.

28. (New) The system of claim 14, wherein the processor is programmed for use with a joint.

29. (New) The system of claim 28, wherein the joint comprises condyles, and wherein the processor is programmed to perform step (c)(i) by determining a joint space in accordance with widths and extreme points of the condyles.

30. (New) The system of claim 29, wherein the processor is programmed to locate the region determined in step (c)(ii) in the joint space.

31. (New) The system of claim 30, wherein the processor is programmed to identify the candidate voxels by dilating surfaces of two bones adjacent to the joint space and identifying the candidate voxels as voxels belonging to dilated versions of both of the two bones adjacent to the joint space.